

S P E C I F I C A T I O N  
T I T L E O F T H E I N V E N T I O N

M E T H O D F O R R E M O T E C O N T R O L C O N V E R S I O N O F  
5           A T L E A S T O N E A P P L I A N C E I N A L O C A L A R E A N E T W O R K

B A C K G R O U N D O F T H E I N V E N T I O N

          An arrangement for translating protocol data units for incompatible networks to one another is an interface which, in some circumstances, has considerable intelligence and is referred to in the specialist world by the term "gateway". This interface carries out functions for layers 3 or above (up to layer 7) in accordance with the OSI reference model (see Course Leaflets, Year 48, 2/1995, pages 102 to 111 and N. Klußmann: Lexikon der Kommunikations- und Informations-technik [Dictionary of Communications and Information Technology], 1997, Hüthig-Verlag, pages 360 to 362.

15           The term network refers to all resources which connect service access points that are at a distance from one another and provide these services for communication purposes. This relates not only to networks with a very limited extent, such as local area networks, but also to networks with a very large extent; for example, telecommunications networks.

20           Networks whose protocol data units are incompatible include, in particular, telecommunications networks (for example, the public telephone network (PSTN), the integrated service digital network (ISDN), the landline network that is based on the asynchronous digital subscriber line (ADSL), the mobile radio network based on the GSM Standard (first and second mobile radio generation), the mobile radio network based on the UMTS Standard (third mobile radio generation), the mobile network based on the DECT and/or PHS Standard, the global computer network (Internet), the electricity supply network and the broadband cable network) as well as any type of local area networks (for example, the home automation system, including a network with a radio transmission path, a PLC transmission path, an IRDA transmission path, 25 an InstaBus transmission path, an HES Bus transmission path, a twisted pair transmission path or a coaxial cable transmission path).

According to the documents *Funkschau [Radio show] 3/1989, pages 45 and 46; Elektronik [Electronics] 18/1995, pages 50 to 58; Elektronik [Electronics] 17/1996, pages 42 to 47 and pages 48 to 53; Elektronik [Electronics] 4/1997, pages 64 to 72; Elektronik [Electronics] 1/1998, pages 30 to 33; Elektronik [Electronics] 17/1998, pages 74 to 77, pages 78 to 81 and pages 82 to 84?*, the home automation system describes the technical management of buildings and dwellings. This covers everything that relates to the convenience of the occupant. This includes, for example, load and energy management, water heating, lighting, ventilation and heating systems, control of motor-driven elements (for example, blinds, garage doors, roller shutters, etc.) and safety and protection devices (for example, smoke/fire alarms, intruder warning systems, access monitoring systems, motion indicators, etc.).

Furthermore, the term "technical management" also covers the control of any other electrical appliances, from adjusting a clock to switching on a coffee machine. For installation of home automation systems (building bus systems), the following preconditions must be essentially satisfied for successful market introduction:

1. No need for any additional wiring
2. Little cost involved
3. Uniform communication standard
4. Interoperability
5. Plug-and-Play capability

In the recent past, various standards for home bus systems have crystallized out in the field of home automation systems, based on different approaches (consumer-item oriented approach, installation-item oriented approach, computer-hardware oriented approach). However, to a greater or lesser extent, these represent specific solutions for home automation. These standards include:

1. For the consumer-item oriented approach, the Consumer Electronics Bus (CEBus), the ESPRIT Home System (EHS) and the Home Bus System (HBS);
2. for the installation-item oriented approach, the Bati Bus, the European Installation Bus (EIB) and the Smart House; and
3. for the computer-hardware oriented approach, the Local Operating Network (LON) and The Real Time Operating System Nucleus (TRON).

The question as to which of the standards that have been mentioned will, in the end, be adopted, and will thus become the de facto standard, depends essentially on the attractiveness of the respective standard for home automation. However, such a system is attractive and really useful only if there is a wide enough range of products which communicate via this network. Only if the house or dwelling occupier knows, when he/she purchases a washing machine, an electric cooker, etc., that the respective appliance will communicate with his/her home bus system, will he/she perhaps be prepared to pay the additional costs for a home automation system, and to install such a system in his/her house. However, if the manufacturer of these appliances does not know which bus system will win the race in the end, then this manufacturer will not, in fact, be prepared to invest in an expensive interface for the respective bus system in order to subsequently find that the appliances cannot, in fact, be sold any better as a result of this investment.

In order to improve the attractiveness of the home automation system described above, an intelligent home interface (residential gateway) is therefore required which is both cost-effective and offers the manufacturer of appliances which can be remotely controlled for home automation purposes wide variation options for the implementation of the interfaces for the bus system that is used for home automation.

One approach for providing an "intelligent home interface" (residential gateway) as it is known from a German patent application entitled "Anordnung zum Ineinanderübersetzen von Protokolldateneinheiten inkompatibler Netze" [Arrangement for translation of protocol data units of incompatible networks to one another], official application file reference 19904544.5, is to provide for translation of protocol data units of incompatible networks to one another, a telecommunications network (for example, the public telephone network (PSTN), the integrated service digital network (ISDN), the landline network based on the asynchronous digital subscriber line (ADSL), the mobile radio network based on the GSM Standard (first and second mobile radio generation), the mobile radio network based on the UMTS Standard (third mobile radio generation), the mobile network based on the DECT and/or PHS Standard, the global computer network (Internet), the electricity supply network and the broadband cable network) and a local area network (for example, in the form of a home automation system, including a network with a radio transmission path, a PLC

transmission path, an IRDA transmission path, an InstaBus transmission path, an HES Bus transmission path, a twisted pair transmission path or a coaxial cable transmission path) via a telecommunications terminal which is connected to the telecommunications network, has a remote control structure and is allocated to any given x interface for  
5 connection to the local network via a specific network adapter.

Owing to the increasing convergence of communications and information appliances, the telecommunications terminal, in this case, has the "intelligent interface" function ("gateway" function) added to it. The information (for example, control commands, status information, alarm messages, etc.) that needs to be  
10 transmitted for remote control of appliances in a local area network is transmitted from the interface in a specific record format, with a first record format part which indicates the appliance identification and/or the appliance address, a second record format part which contains the control command for the appliance, and a third record format part which contains the control payload information.

15 A telecommunications terminal designed in this way makes it possible to drive any appliances connected to that telecommunications terminal.

To do this, an operator has to use a remote control unit, such as by simply transmitting the appliance identification and the control command, to initiate an action in the appliance defined by the appliance identification.

20 However, in many cases, there is a customer requirement to switch scenarios on and off. A scenario in this case refers to when an instruction is transmitted by the user, a number, that is to say a selection, of the appliances which are connected to the telecommunications terminal being switched to a normal mode for a specific situation. By way of example, the operator might wish to lower all the window roller shutters  
25 and switch on an outside light in the evening by transmission of the control instruction or, when he/she is absent, lower all the window roller shutters and switch on a movement sensor in order to prevent break-ins with this evening scenario or absence scenario.

One way of satisfying this requirement is represented by a so-called scenario  
30 module. This scenario module is an autonomous appliance which is used in a building bus system constructed, for example, using the EIB bus approach. This scenario module drives a number of appliances centrally and, like the appliances to be

controlled, is, for example, connected to the telecommunications terminal. In order to switch a scenario on and off, an instruction is transmitted via the telecommunications terminal to the scenario module, which then, via the house bus that is used, controls the selection of appliances in the mode that is required and desired for that scenario.

5 This solution has the disadvantage of the need for additional hardware which, furthermore, communicates only with the building bus system that is being used.

An object to which the present invention is directed is to specify a method for remote control conversion, particularly in home automation systems, which can be implemented cost-effectively and easily, and can be used universally for respectively  
10 different network types (for example, the types of networks mentioned above).

### SUMMARY OF THE INVENTION

As such, in the method according to the present invention, a unique appliance identification is allocated to each appliance which is connected to a telecommunications terminal and is, thus, included in a local area network, via which  
15 the telecommunications terminal can address the respective appliance, in particular for remote control, and via which each appliance is identified. An association between, in each case, one channel and at least one appliance identification is stored in a list, in which case, if one and only one appliance identification is associated with the channel, that channel is associated with a primary data record which contains at least the  
20 individual appliance identification and, if at least one appliance identification is associated via at least one control command with that channel, that channel is associated with a secondary data record, which contains at least the one appliance identification with at least one control command in an organized sequence. If a  
25 selection of a channel is transmitted to the telecommunications terminal, then the data record associated with that channel is read from the list. If the data record is a primary data record, then, on the basis of the single appliance identification contained in it, an appliance which is connected to the telecommunications terminal is selected and is only driven. If the data record is a secondary data record, then an appliance which is  
30 connected to the telecommunications terminal is selected and driven successively on the basis of each appliance identification, and a control command is in each case transmitted to the appliance successively.

The method according to the present invention allows a user of the remote control for at least one appliance which is contained in a local area network and is connected to a telecommunications terminal to be provided with the capability to control a scenario in a home automation system, in which case scenarios can be set by an appliance via a control command. Furthermore, at least one appliance which is connected to the telecommunications terminal in the local area network can be controlled remotely without any additional hardware complexity and independently of the solution approaches used in the home automation system.

Additional features and advantages of the present invention are described in, and will be apparent from, the following Detailed Description of the Invention and the Figures.

### BRIEF DESCRIPTION OF THE FIGURES

Figure 1 shows a flowchart relating to the conversion of remote control of at least one appliance which is contained in a local area network and is connected to a telecommunications terminal according to the teachings of the present invention.

### DETAILED DESCRIPTION OF THE INVENTION

At the start 1 of the method, which is running in a telecommunications terminal (preferably in the background) so that the normal processes in telecommunications terminals take place substantially without any disturbance, a check is first of all carried out to determine whether a new appliance has been connected to the telecommunications terminal.

If a new appliance has been connected, an appliance number ID is generated for that appliance and uniquely allocated thereto for appliance identification.

The appliance number ID is generated such that a sequential number is allocated to the appliances. As such, the respective most-recently-allocated appliance number ID is incremented, and is allocated to the respective newly connected appliance.

As an alternative to this, it is possible to allocate to the appliance, as the appliance identification, an appliance number ID which is predetermined by that appliance and, after being connected to the telecommunications terminal, is transmitted to this telecommunications terminal during an initialization process.

A combination of alphabetic and numerical characters is also feasible for generating an appliance identification ID.

After allocation of the appliance number ID, the user is requested to state a channel number LK. If a stored secondary data record already exists for this channel number, then the appliance number ID is added to this data record and the system waits for control commands which can be associated with that appliance number to be entered, since the secondary data record implies a scenario control process. Otherwise, a new data record associated with that channel number LK is formed, and the appliance number ID is added to this new data record.

When the new data record has been formed and a scenario control process is intended, the user in the next step enters at least one control command which is associated with the appliance number ID and is stored together with the associated appliance number ID as a secondary data record. If a new data record associated with the channel number LK has been formed, containing only a single appliance number ID, no scenario control is intended. If the channel number is not intended to output any scenario control, then no control command is entered and the appliance number ID is stored as a primary data record.

If the check at the start 1 of the method finds that no new appliance has been connected, a check is carried out to determine whether there is any desire to drive an appliance. If this is the case, the user transmits a channel number LK.

On receiving the channel number LK, the data record which is stored in the list and is associated with this channel number LK is read and evaluated.

If the data record contains only one appliance number ID without any control command, then the data record is a primary data record and only the appliance identified by the appliance number ID is driven, and further user statements are then requested.

If the data record contains at least one appliance number ID with at least one control command, then the data record is a secondary data record and an appliance identified by an appliance number ID is, in each case, driven in sequence, and a control command which has been stored such that it is associated with the respective appliance number ID is transmitted, successively, to the respective appliance. As such, only when all the control commands which have been stored such that they are

associated with an appliance number ID have been processed is the next appliance identified by the next appliance number ID driven, and the control commands which are stored in an associated manner are transmitted. After selection of the last appliance number ID and processing of the control commands which have been stored  
5 associated with the appliance number ID, all the appliances which are identified by the appliance number ID contained in the secondary data record are in a state defined by the control commands which are stored associated with the appliance numbers ID.

The statement of the channel number LK thus allows the user to carry out scenario control, in which at least one appliance is changed to a defined state.

10 If no appliance drive is desired, then the method is likewise continued at the start point 1.

Although the present invention has been described with reference to specific embodiments, those of skill in the art will recognize that changes may be made thereto without departing from the spirit and scope of the present invention as set forth in the  
15 hereafter appended claims.